

HISTORICAL VIGNETTES IN VASCULAR SURGERY

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The influence of Dominique Jean Larrey on the art and science of amputations

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“Un grand nombre de blessures, faites par l’artillerie, ont exigé l’amputation d’un ou de deux membres. J’en ai pratiqué, dans les premières vingt-quatre heures, environ deux cents . . .”

“A great number of wounds, created by artillery, required the amputation of one or two limbs. I accomplished, in the first twenty-four hours, around two hundred . . .”

Dominique Jean Larrey, writing of the Battle of Borodino

Amputation is viewed negatively by vascular surgeons of today, but for many centuries, amputation was one of the primary treatments of the injured, probably saving more lives of the victims of serious limb trauma than any other operation that could then be offered. Even today, there is a role for primary amputation of the extremely mangled extremity, and each of these cases challenges our surgical mettle. Over the years, some of the true greats of surgery were involved in advancing the art and science of amputation. Many of the best surgeons believed in “life over limb” and practiced amputations freely, including Galen and Paré. However, there is no one whose name is more appropriately associated with amputations than Baron Dominique Jean Larrey. Larrey arguably did more amputations than any other surgeon to ever live upon the earth. And he did them very quickly, often under the most challenging circumstances, with impressive results. The goal of this report is to offer an historic reflection of the life and times of Larrey in view of his valuable contributions to the art and science of amputations (Fig 1).

Dominique Jean Larrey came from humble circumstances to become one of the principal surgeons of a

massive army, led by Napoleon, which engaged in battle across the European continent and the Mid-East for almost 20 years. He was to participate in 25 campaigns, 60 battles, and 400 engagements.¹ In his unique position as surgeon to the Imperial Guard, Larrey was required to deal with huge numbers of casualties, many of whom he treated with amputations. This report will review the training and formation of Larrey, the theory and thinking behind the formation of the Flying Ambulance, the reasoning that led Larrey to adopt the policy of early and sometimes major amputation, and several of the more notable battles and amputations of his long and illustrious career (Fig 2).

THE FORMATION YEARS

Larrey was born in the little village of Beaudéan, in the Pyrénées mountains, south of the city of Tarbes, in extreme southern France, on July 8, 1766. His childhood was in many ways idyllic, although his father died while Larrey was very young, and his family was certainly of limited means. He was tutored by the village priest, Abbé Grasset, who noted that the young man was a very capable pupil. At age 13, he set off alone and on foot to travel all the way to Toulouse, some 70 miles, to study medicine under the supervision of his uncle, Alexis Larrey, who was Surgeon-in-Chief to the local hospital of that city. He was to stay in Toulouse for the next 7 years or so, improving his classical education but also spending much time in the dissection laboratory, helping with wound care and doing a variety of activities as a young surgeon-in-training. His academic career was completed by age 19, culminated by winning first prize as a student in competition with his fellows. By his young adulthood, Larrey had spent countless hours in the dissection lab and on the wards caring for surgical patients. During this training, he was no doubt forming his own opinions about the art and science of surgery of that day. In the late 1700s, there was certainly much debate about disease, with many theories about the causes of infections, how infectious diseases were spread, etc. Larrey had his own views on these subjects, often fanciful, but certainly not extreme in comparison with others of the time. He was correct in one regard: he had become an astute observer of nature and of the progression of wounds, and having seen the consequences of delay in removal of devitalized tissue, he became a great advocate of immediate

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Fig 1. The Baron Dominique Jean Larrey, Surgeon to Napoleon's Imperial Guard (The frontispiece portrait from Triaire, Paul, *Dominique Larrey et les Campagnes de la Revolution et de l'Empire*, Maison Alfred Mame et Fils, Tours, 1902).

surgery in order to save the life of an otherwise condemned patient. He used the rapid employ of amputation to attempt the cure. He was a prolific writer and author, and his five-volume set of *Mémoires de Chirurgie Militaire, et Campagnes* is the principal source of information of this report. One of the primary goals of his *Mémoires*, as he states in its introduction, was this, "I desire to be able to draw attention here to the surgeons of the Armies. This is, in effect, the just application of the precept on which rests the life of the wounded patient: *it is necessary to know to take advantage of the favorable moment to do the amputation, without waiting, against the advice of the majority of authors to wait until the dead tissue is well established.*"² (Emphasis added).

THE GENESIS OF THE FLYING AMBULANCE

After a stint as a Navy surgeon, Larrey returned to Paris at the time of the French Revolution in 1789 and soon became a surgeon of the French Army. The idea of a "flying ambulance" was conceived in the autumn of 1792, during the Battle of the Rhine, when Larrey was serving in the city of Spire and saw the consequences of delay in treating a group of wounded; these men had been neglected for up to 36 hours and died simply because of a ready lack of help. At that point, he began thinking of the possibility of organizing an ambulance service that could bring prompt relief to

the wounded, even on the field of battle. This reasoning eventually led to the establishment of "les ambulances volantes," or "flying ambulances," which were organizations of medics who were equipped and trained to go out on the battlefield and to immediately render care, including on-the-spot surgery and to quickly evacuate the wounded. These organizations were usually well equipped with necessary supplies, including two-wheeled and four-wheeled wagons (for mountainous or flat terrain) pulled by horses, which rapidly removed the wounded from harm's way. The flying ambulance was much more than just a method of transportation for the wounded. It involved finding shelter, food, bandages, water—everything required for survival and regaining good health. After the system was demonstrated to Napoleon and approved by him, this organization began to make a substantial difference in the fate of the wounded, and Larrey's reputation as a friend of the wounded soldier grew. Prior to Larrey, the wounded were left, sometimes for days, until the battle ended. They were victims of thieves, insects, heat, cold, and lack of water. As he stated: "These brave republicans . . . found their safety in the flying ambulance which was now known throughout the entire army for the immediate help it could bring in all battles."³ The ability to properly do amputations was closely tied to the capabilities of the flying ambulance, as proper wound care, nutrition, and postoperative evacuation were key to the success of the procedure (Fig 3).

THE REASONING OF THE CONCEPT OF EARLY AMPUTATION AND MAJOR AMPUTATION

The following is a quote from a Lieutenant in the infantry, taken from The Myles Gibson military lecture: Surgery in the Napoleonic Wars by M.K.H. Crumplin from the UK, describing a scene of wounded English soldiers in the battles in the Peninsular Wars of 1807-08, (not under Larrey's care): "I looked through the grating and saw about 200 soldiers waiting to have their limbs amputated while others were arriving every moment. It is difficult to convey an idea of the sight or appearance of these men. They had been wounded on the 5th and this was the 7th. Their limbs were swollen to enormous size and the smell from the gunshot wounds was dreadful. Some were sitting upright against a wall under the shade of a number of chestnut trees and as many were wounded in the head as well as the limbs. The ghastly countenance of these poor fellows presented a dismal sight. Streams of gore which had trickled down their cheeks was hardened by the sun and gave their faces a glazed and copper coloured hew. Their eyes were sunk and fixed and they resembled more a group of bronze figures than anything human. There they sat, silent and statue-like, waiting for their turn to be carried to the amputating tables."⁴ This sort of surgical nightmare was precisely what Larrey was striving to avoid as he advocated early amputation. Over and over again, throughout his *Mémoires*, he tells how quickly the wounded are victimized by tetanus and sepsis, and how their condition rapidly improved after amputation. Usually he performed amputations on fore-

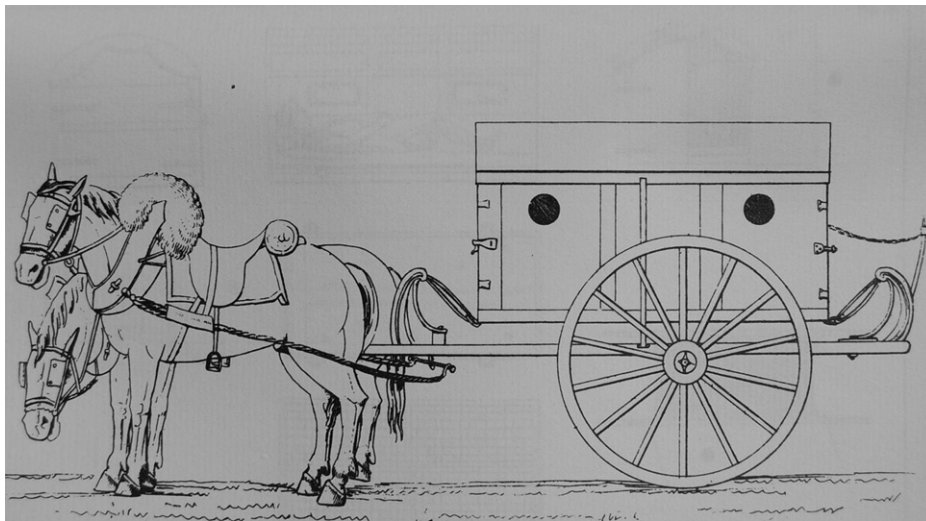


Fig 2. One of the two-wheeled ambulance wagons of the Flying Ambulance organization (Volume I, Plate III from Larrey DJ. *Mémoires de Chirurgie Militaire, et Compagnes*. 4 vols. J Smith, Paris, 1812-1817).

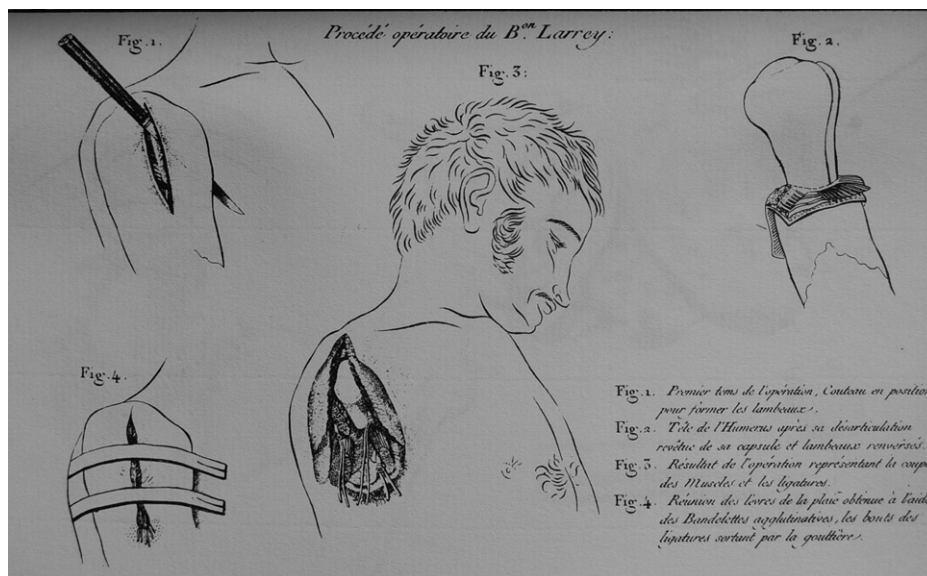


Fig 3. A shoulder disarticulation operation, as performed by Larrey (Volume IV, Plate XIX from Larrey DJ. *Mémoires de Chirurgie Militaire, et Compagnes*. 4 vols. J Smith, Paris, 1812-1817).

arms and lower legs, and less often on thighs and upper arms or shoulders. Rarely, he faced the daunting challenge of hip disarticulations. While in Egypt, two such cases were presented to Larrey. That operation had seldom been done in his day, and many critics were quick to publicly lambast anyone who would try it. Larrey said this to his detractors: "However cruel that an operation may be, it is an act of humanity in the hands of the surgeon when he can save the life of the injured, in danger, and the more the danger is great and pressing, the more the response must be prompt and energetic. *Ad extreme morbos, extrema remedia exquisite optima* (Hippocr.). In this circumstance, the man of the

art does his duty, and absolutely does not think about his reputation."⁵

NOTABLE AMPUTATIONS PERFORMED BY LARREY

Many of the leaders of the French Army were to become patients to Larrey. One in particular was the great Marshall Jean Lannes, a favorite of Napoleon and someone much admired by Larrey, who was hit by a three-pound ball during the battle of Essling on May 22, 1809, which shattered the left knee and also injured the right thigh, and left Lannes in extremis. Larrey was taken aback by the challenge of this

situation. "How my situation was so difficult," he later recorded. He wanted to offer hope to this brave leader, and yet he could see that the eventual outcome was at best questionable. Larrey knew and admired Lannes, who had been his great friend and his patient also in Syria and Egypt. "I swear that this was one of the most difficult circumstances of my life." All agreed that an amputation was needed, but no one dared to try it, given the precarious state of the patient. Finally, Larrey quickly amputated the leg, taking less than 2 minutes, and this was well tolerated by Lannes. Lannes was to die at daybreak on May 30, 1809.⁶

NOTABLE BATTLES

The Battle of Borodino, September 7, 1812 (named after the village at the battlefield), was also called "the Battle of the Moskova (or Moskva)" (named after the nearby river), or simply "the Battle of Moscow." It was the epic battle of the French against the well-entrenched Russians, the inspiration for Pyotr Ilyich Tchaikovsky's *1812 Overture* and the last bit of resistance to the French before taking Moscow.⁷ Larrey estimated that 127,000 Frenchmen and 140,000 Russians came face to face on that day, with a resultant 12,000 to 13,000 French and 20,000 Russians killed or wounded. Some 40 French generals were among the casualties.⁸ In Larrey's *Mémoires*, he states that the wounds from this battle were particularly serious, almost all coming from artillery or from muskets at close range, and the Russian musket balls were heavier and more deadly than those of the French. And then Larrey, almost in passing, mentions the amputations he performed at Borodino. In his words: "A great number of wounds, created by artillery, required the amputation of one or two limbs. I accomplished, in the first twenty-four hours, around two hundred; they would have had a better outcome if all our wounded had a place, straw to lie on, blankets and food. We were unhappily lacking all resources, and very far from places which would have been able to furnish them to us."⁹ Wangenstein calculated that this burden of surgery would require an amputation every 7 minutes! He also points out that Larrey had his critics, who claimed that he was too quick to amputate, including the Edinburgh military surgeon Blackadder. Blackadder stated that Larrey was guilty of "operating mania."¹⁰ Despite the critics, there is ample evidence from Larrey's writings that he often would refuse to amputate and would rather save the less-badly injured limb. One account is of General Claude Pajol, who was shot in the left forearm, breaking both the radius and ulna. Triaire's account is as follows: "Larrey, who had been accused of being too quick to amputate, practiced instead a conservative sort of surgery each time it was possible. He refused to amputate Pajol's arm despite the advice of his surgeons, instead debriding the wound and dressing it with a splint. During the retreat, he continued to treat the wound with dressing changes."¹¹ Larrey was primarily

known for amputations, but his *Mémoires* are full of accounts of surgery on the eye, the brain, the bowel, and the face. He was unafraid to attempt the surgical cure, no matter the injury, and was very innovative and creative in his work.

SUMMARY

This report describes the work of a surgical force of nature, one who changed and improved the practice of amputation, and who was heralded as a savior of the common soldier. Dominique Jean Larrey continues to have a strong influence on military surgeons, even today. He remains a great hero, a role model to the rest of us, and arguably the finest military surgeon to have ever lived.

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